CLAIMS

What is claimed is:

1. A torque request generation system for use with a coordinated torque control system of a vehicle, comprising:

an input receiving a vehicle speed and an axle torque command;

a datastore recording a three-dimensional torque surface defined by a coordinate system having a first axis related to the axle torque command, a second axis related to the vehicle speed, and a third axis related to an axle torque request; and

a torque request generation module accessing said datastore and generating a torque request based on a correlation between the axle torque command and the vehicle speed respective of the three-dimensional torque surface.

2. The system of claim 1, wherein said datastore includes a normalization function respective of at least one of vehicle speed and axle torque command and adapted to reference the three dimensional torque surface via a nominal maximum axle torque curve residing in a plane formed by the second and third axes, thereby allowing dynamic, online adjustment of a creep speed threshold.

3. The system of claim 2, wherein the creep speed threshold is dynamically determined as a function of idle set speed, such that the creep speed threshold changes as the idle set speed changes.

4. The system of claim 2, further comprising a nominal maximum torque adjustment module adjusting the nominal maximum axle torque based on the axle torque command and a fraction of maximum torque available due to ambient conditions relating to at least one of temperature and altitude.

5. The system of claim 2, further comprising an ambient compensation module adapted to provide varying degrees of ambient compensation, wherein effects of altitude and temperature in maximum torque output are employed to provide at least one of partial compensation, no compensation, and full compensation of these effects.

6. The system of claim 1, wherein said torque request generation module compares the vehicle speed to a creep speed threshold of the three-dimensional torque surface, and selectively determines whether to calculate a coast down region torque request versus a creep region torque request based on whether the vehicle speed exceeds the creep speed threshold.

7. The system of claim 6, wherein said torque request generation module computes a pedal breakpoint based on the vehicle speed respective of a pedal breakpoint curve residing in a plane formed by the first and second axes, compares the pedal command to the pedal breakpoint, and selectively determines whether to calculate a negative coast down region torque request versus a positive coast down region torque request based on whether the pedal command exceeds the pedal break point.

8. The system of claim 7, wherein said torque request generation module normalizes the pedal command based on the pedal break point, adjusts the vehicle speed based on the creep speed threshold, computes a normalized positive torque based on a normalized pedal command and an adjusted vehicle speed, and multiplies an adjusted nominal maximum axle torque by the normalized positive torque, thereby producing the positive coast down region torque equest.

9. The system of claim 7, wherein said torque request generation module normalizes the pedal command based on the pedal break point, multiplies a normalized pedal command by a negative real-time coast down torque, thereby producing a delta torque based on the real-time coast down torque, and adds a positive real-time coast down torque to the delta torque, thereby producing the negative coast down torque request.

10. The system of claim 6, wherein said torque request generation module normalizes the vehicle speed based on the creep speed threshold, computes a normalized creep region torque based on a normalized vehicle speed and the pedal command, subtracts a real-time coast down torque from an adjusted nominal maximum axle torque, thereby producing an axle torque range, and multiplies the normalized creep torque by the axle torque range, thereby producing a de-normalized creep region torque.

11. The system of claim 1, further comprising a torque request elevation module that compares the pedal command to a predetermined threshold, and elevates the torque request above a nominal maximum achievable torque as a function of an amount by

which the pedal command exceeds the predetermined threshold relative to an upper range of pedal command.

12. The system of claim 11, wherein an upper range of elevation accounts for statistical variability between vehicle engine capabilities relating to maximum achievable torque.

13. A torque request generation method for use with a coordinated torque control system of a vehicle, comprising:

receiving an axle torque command from a driver input device;

receiving input indicating vehicle speed; and

generating a torque request based on a correlation between the axle torque command and the vehicle speed respective of a three-dimensional torque surface residing in processor memory and defined in terms of a coordinate system having a first axis related to the axle torque command, a second axis related to the vehicle speed, and a third axis related to the axle torque request.

14. The method of claim 13, further comprising employing a normalization function respective of at least one of vehicle speed and axle torque command in conjunction with a nominal maximum axle torque curve residing in a plane formed by the second and third axes to reference the three dimensional torque surface, thereby allowing dynamic, online adjustment of a creep speed threshold.

15. The method of claim 14, further comprising adjusting the nominal maximum axle torque based on the axle torque command and a fraction of maximum torque available due to ambient conditions relating to at least one of temperature and altitude.

16. The method of claim 15, further comprising providing varying degrees of ambient compensation, wherein effects of altitude and temperature in maximum torque output are employed to provide at least one of partial compensation, no compensation, and full compensation of these effects.

17. The method of claim 13, further comprising:

comparing the vehicle speed to a creep speed threshold of the three-dimensional torque surface; and

selectively determining whether to calculate a coast down region torque request versus a creep region torque request based on whether the vehicle speed exceeds the creep speed threshold.

18. The method of claim 17, further comprising:

computing a pedal breakpoint based on the vehicle speed respective of a pedal breakpoint curve residing in a plane formed by the first and second axes;

comparing the pedal command to the pedal breakpoint; and

selectively determining whether to calculate a negative coast down region torque request versus a positive coast down region torque request based on whether the pedal command exceeds the pedal breakpoint.

19. The method of claim 18, further comprising:

normalizing the pedal command based on the pedal breakpoint;

adjusting the vehicle speed based on the creep speed threshold;

computing a normalized positive torque based on a normalized pedal command and an adjusted vehicle speed; and

multiplying an adjusted nominal maximum axle torque by the normalized positive torque, thereby producing the positive coast down region torque request.

20. The method of claim 18, further comprising:

normalizing the pedal command based on the pedal breakpoint;

multiplying a normalized pedal command by a negative real-time coast down torque, thereby producing a delta torque based on the real-time coast down torque; and

adding a positive real-time coast down torque to the delta torque, thereby producing the negative coast down region torque request.

21. The method of claim 17, further comprising:

normalizing the vehicle speed based on the creep speed threshold;

computing a normalized creep torque based on a normalized vehicle speed and the pedal command;

subtracting a real-time coast down torque from an adjusted nominal maximum axle torque, thereby producing an axle torque range; and

multiplying the normalized creep torque by the axle torque range, thereby producing a de-normalized creep region torque.

22. The method of claim 13, further comprising:

comparing the pedal command to a predetermined threshold; and

elevating the torque request above a nominal maximum achievable torque as a function of an amount by which the pedal command exceeds the predetermined threshold relative to an upper range of pedal command.

23. The method of claim 22, further comprising statistically determining an upper range of elevation based on variability between vehicle engine capabilities relating to maximum achievable torque.